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Timely Access to Quality Health Care Among Georgia Children Ages 4 to 17 Years

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Abstract

We examined factors associated with children's access to quality health care, a major concern in Georgia, identified through the 2010 Title V Needs Assessment. Data from the 2007 National Survey of Children's Health were merged with the 2008 Area Resource File and Health Resources and Services Administration medically under-served area variable, and restricted to Georgia children ages 4–17 years (N = 1,397). The study outcome, *access to quality health care* was derived from *access to care* (timely utilization of preventive medical care in the previous 12 months) and *quality of care* (compassionate/culturally effective/family-centered care). Andersen's behavioral model of health services utilization guided independent variable selection. Analyses included Chi-square tests and multinomial logit regressions. In our study population, 32.8 % reported access to higher quality care, 24.8 % reported access to moderate quality care, 22.8 % reported access to lower quality care, and 19.6 % reported having no access. Factors positively associated with having access to higher/moderate versus lower quality care include having a usual source of care (USC) (adjusted odds ratio, AOR:3.27; 95 % confidence interval, 95 % CI 1.15–9.26), and special health care needs (AOR:2.68; 95 % CI 1.42–5.05). Lower odds of access to higher/moderate versus lower quality care were observed for non-Hispanic Black (AOR:0.31; 95 % CI 0.18–0.53) and Hispanic (AOR:0.20; 95 % CI 0.08–0.50) children compared with non-Hispanic White children and for children with all other forms of insurance coverage compared with children with continuous-adequate-private insurance. Ensuring that children have continuous, adequate insurance coverage and a USC may positively affect their access to quality health care in Georgia.

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Keywords

National survey of children's health; Children's health care; Quality health care; Health insurance; Georgia

Introduction

Although access to health care is an important predictor of health outcomes, the *quality* of care received is not always guaranteed and can also have an impact on health outcomes. According to the Institute of Medicine's report on quality [1], the United States health care delivery system does not provide consistent, high-quality medical care to all people. Improvements in access to and quality of primary care, the foundation for health services, leads to better health outcomes and reduced disparities between population groups [2]. Health care access, the *timely use* of personal health services to achieve the best possible health outcomes [3], has been identified as a major health concern for all maternal and child health populations in Georgia, especially children, through the Title V Block Grant 5 Year Needs Assessment [4]. Access is essential for ensuring the receipt of preventive services, such as age-appropriate vaccinations and screenings. It is also a prerequisite for the optimal management of chronic childhood diseases [5]. Health care access influences children's physical and emotional growth, development, overall health and well-being [6].

However, mere access is not sufficient for desirable outcomes; the quality of care is equally important. Quality care is safe, effective, *patient-centered*, timely, efficient, and equitable [1]. Patient-centered or personalized care involves providing care that is respectful of and responsive to individual patient preferences, needs, and values; and ensuring that patient values guide all clinical decisions.

Previous research using the 2007 National Survey of Children's Health (NSCH) data showed that 88.3 % of children 0–17 years of age in Georgia had a preventive medical visit in the past year; similar to 88.5 % nationwide [7]. However, only 58.5 % of Georgia's children received care within a medical home. Family-centered care is a composite measure, and is one of the components of the medical home. The percentage of Georgia parents that reported `always' or `usually' experiencing the following family-centered care components was: doctor spends enough time (79.3 %), doctor listens carefully (89.8 %), doctor provides specific needed information (87.8 %), and doctor helps parent feel like a partner in care (89.0 %) [8].

Previous research has focused on factors associated with health care access [5, 9–19] or quality [16, 17, 20, 21] but not a composite measure of access to quality health care. Using the 2007 NSCH dataset, we investigate factors associated with timely access to quality health care in Georgia among children ages 4–17 years.

Methods

Study Design

The 2007 NSCH public use file for Georgia was merged with selected 2007 variables from the 2008 Area Resource File (ARF) and the Health Resources and Services Administration (HRSA) medically underserved area (MUA) variable, using the restricted-use county of residence variable (available through the National Center for Health Statistics [NCHS] Research Data Center) [22]. The 2007 NSCH is a national, cross-sectional, random-digit-dial landline telephone survey conducted as part of the State and Local Area Integrated Telephone Survey (SLAITS) program by NCHS, Centers for Disease Control and Prevention (CDC), in conjunction with the Maternal and Child Health Bureau, HRSA. One child was selected randomly from each household to be the focus of the parent or guardian interview. During April 2007 to July 2008, a total of 91,642 interviews were completed nationwide and 1,782 interviews were completed in Georgia. The national response rate was 46.7 %, and for Georgia, the response rate was 44.7 % [23].

In the ARF, which is produced by the Bureau of Health Professions, HRSA provides county-level data on several indicators, including geographic codes and classifications, health professions supply with detailed demographics, and health facility counts and types [24]. The ARF is updated and issued annually. Medically underserved areas/populations are areas or populations designated as having too few primary care providers, high infant mortality, poverty and/or an elderly population [25]. The MUA data for Georgia was downloaded from the HRSA website [25].

For our study, we focused on Georgia children ages 4–17 years (n = 1,397). This was necessary to ensure the NSCH question wording about provider visits during the 12 months preceding the survey completion matched the American Academy of Pediatrics guidelines recommending annual well child visits from age 3 years until age 21 years [26]. Prior to age 3 years, the American Academy of Pediatrics guidelines recommend well child visits more frequently than annually.

Variables

Dependent variables—In order to gain a more comprehensive understanding of access to care and the receipt of quality health care, we created a composite variable—*access to quality health care*, incorporating the constructs of access to care (utilization of preventive medical care in the previous 12 months and no occasion of delay or denial of needed care) and the *quality of care received*. Each of these constructs were examined independently in previously published work, providing the evidence necessary for supporting the development of a composite variable that merges the two constructs. Access to care and quality of care were defined consistent with this previously published work [27]. *Access to health care* is a dichotomous outcome derived from two survey items: utilization of any preventive medical care, and delay or non-receipt of needed care; both in the prior 12 months. Children who had at least one preventive medical care visit and who did not experience any delay or non-receipt of needed care were coded as having access, while those with any other combination (except missing observations) were coded as not having access.

Quality of care was derived from five questions related to how family-centered the received care was—whether the health care provider: (1) spends enough time with child; (2) listens carefully to parent; (3) is sensitive to family values and customs; (4) provides specific needed information; and (5) makes parent feel like a partner in child's care. Children were classified as having received higher, moderate, or lower quality care based on parents' responses to these questions. Children in the higher quality care category had a parental response of “always” to all questions, children in the moderate quality care category had a parental response of “always” or “usually” to all questions, and children in the lower quality care category had a parental response of sometimes or never to at least one of the five questions.

We considered each of the five questionnaire items important in determining quality, hence our conservative approach to categorization. Because these five questions were asked of participants who had encountered the health care system either through preventive or specialty care, some participants with no access to preventive medical care had valid responses on the questionnaire items for the quality variable. In creating the composite variable, all those who had no access to care were coded as having no access to care, irrespective of their coded value for quality of care. The other three levels were access to lower, access to moderate, and access to higher quality care.

Independent Variables—Independent variable selection was guided by Andersen's behavioral model of health services utilization (comprising the external environment, predisposing, enabling, and need domains) [15, 28–31]. *The external environment domain* includes factors related to the child's neighborhood: neighborhood detracting factors (litter or garbage on the street or the sidewalk, dilapidated housing, vandalism—broken windows/ graffiti) and neighborhood amenities (sidewalks or walking paths, parks or playgrounds, recreation centers, and libraries).

The predisposing domain includes factors that would predispose children to using health care. Factors within the predisposing domain include children's age and sex, number of adults in the household, number of children in the household, parental educational attainment, children's race/ethnicity, any employment of household member for 50 out of 52 weeks, family structure (two parent biological/adopted; two parent step; single mother, no father present; other), immigrant family type (foreign-born child, US-born child with two foreign-born parents, US-born child with one foreign-born parent, non-immigrant family), primary household language, length of stay of mother (biological, step, foster, or adoptive) in the US, social support, and social capital index. The neighborhood social support variable was created from four survey items: in this neighborhood, (1) people help each other out; (2) we watch out for each other's children; (3) there are people I can count on; and (4) there are adults whom I trust to help my child if he or she got hurt or scared while playing outside. Children whose parents gave a response of “definitely agree” on all questions were categorized as having strong social support. Children whose parents gave a response of “definitely agree” or “somewhat agree” on all questions were classified as having moderate social support, while those whose parents gave a response of “somewhat disagree” or “definitely disagree” on at least one of the four questions were classified as having weak neighborhood social support. We also created a social capital index from the same four

items for sensitivity testing. Results were similar to those when using the neighborhood social support variable; however precision decreased.

The enabling domain includes community and personal enabling resources. Variables in this domain include the number of federally qualified health centers (FQHCs), MUAs, health professional shortage areas for primary care in the county, rural–urban designation at the county level, insurance coverage (never/intermittently insured, continuous-inadequate-private, continuous-inadequate-public, continuous-adequate-private, continuous-adequate-public), income status (measured as the percentage of the 2007 federal poverty level [FPL]), having a usual source of care (USC), and having a personal health care provider. The insurance coverage variable is a composite variable created from questions covering current insurance; gaps in the previous 12 months; adequacy in terms of benefits, providers, and out-of-pocket costs; and insurance type (public or private) [27].

The need domain includes child's special health care need status and child's overall health status. Apart from three variables (number of FQHCs, health professional shortage areas, and rural–urban designation), which were obtained from the 2008 Area Resource File (ARF), and the MUA variable downloaded from the HRSA website [25], all other variables were obtained from the 2007 NSCH Public Use File.

Data Analysis

Descriptive statistics were produced and bivariable analyses using Chi-square tests were conducted to assess associations between the independent variables and the access to quality care outcome. Significance testing was performed at alpha = 0.05. Given that the outcome had more than two categories, multinomial logistic regression models were used. Separate models were developed for each domain of Andersen's theoretical framework as a step to building the final overall model. A conservative cut-off, $p = 0.3$ in bivariate analysis from our previous work [27] was used as the criterion for entry into the domain specific models and then within the current study for entry into the full model. For modeling, the access to higher quality care and access to moderate quality care groups were combined during preliminary work that demonstrated similar effect sizes between these two groups. Those with access to higher/moderate quality care were compared to those with access to lower quality care, while those with access to lower quality care were compared to those with no access to care.

The sample size for the final model was 1,257. When compared with the initial study population (n = 1,397), both samples were found to be similar on demographic variables. To assess generally, how results may differ from the full population of children, additional analysis was conducted among the subpopulation of children with special health care needs (CSHCN, n = 319)—children who are known to need health care in a magnitude that is above and beyond that needed by other children of the same age/developmental stage. All analyses were conducted using SAS-callable SUDAAN 10.0.1 (SAS Institute, Research Triangle Park, NC) to account for the complex survey design. This study was approved by the Georgia Department of Public Health Institutional Review Board.

Results

Study population

Among Georgia children ages 4–17 years, 32.8 % had access to higher quality care, 24.8 % had access to moderate quality care, 22.8 % had access to lower quality care, and 19.6 % had no access to care (Table 1).

Bivariate Analysis

Variables associated with access to quality health care in bivariate analysis include presence of a recreation center in the neighborhood, parental educational attainment, race/ethnicity, immigrant family type, neighborhood social support, insurance coverage, FPL, having a USC, having a personal doctor/nurse, and child's overall health status (Table 2).

Multivariable Analysis

In domain-specific regression models, variables positively associated with having access to higher/moderate quality versus access to lower quality care by domain were: environmental—having recreational facilities in the neighborhood, and no presence of vandalism in the neighborhood; predisposing—being female, parental educational attainment greater than high school, and living in strongly supportive neighborhoods; enabling—having a USC; and need—CSHCN status, and excellent/very good child overall health status (Table 3). In the enabling domain, when compared to children with continuous-adequate-private insurance, children in every other category of insurance had lower odds of having access to higher/moderate quality care versus access to lower quality care. Additionally, children living at >100–200 % of the FPL had lower odds of having access to higher/moderate versus lower quality care compared to those living at or below 100 %.

Those who had greater odds of having access to lower quality care versus no access to care by domain were: environmental—those who had paths in the neighborhood; pre-disposing—being non-Hispanic Black; enabling—having continuous-inadequate-public or continuous-adequate-public insurance. Those who had lower odds of having access to lower quality care versus no access to care, by domain, were: predisposing—children living in strongly supportive neighborhoods when compared to those living in weakly supportive neighborhoods; and enabling—children living in counties with one FQHC when compared to those living in counties with no FQHC (Table 3).

In the full model (all domains included simultaneously), among all Georgia children ages 4–17 years, those with higher odds of having access to higher/moderate quality care versus access to lower quality care, by domain, were: environmental—children with no presence of vandalism in their neighborhoods (AOR 3.37; 95 % CI 1.40–8.13) compared to those with vandalism; predisposing—females (AOR 1.62; 95 % CI 1.02–2.57) compared to males, and those living in strongly supportive neighborhoods (AOR 3.50; 95 % CI 1.84–6.64) compared to those living in weakly supportive neighborhoods; enabling—those with a USC (AOR 3.27; 95 % CI 1.15–9.26) compared to those with no USC; and need—CSHCN (AOR 2.68; 95 % CI 1.42–5.05) compared to children with no special health care needs, and

children in excellent (AOR 2.86; 95 % CI 1.38–5.91) or very good overall health (AOR 2.19; 95 % CI 1.01–4.76) compared to children in good/fair/poor overall health (Table 4).

In the predisposing domain, non-Hispanic Blacks (AOR 0.31; 95 % CI 0.18–0.53) and Hispanics (AOR 0.20; 95 % CI 0.08–0.50) had lower odds of having access to higher/moderate versus lower quality care, compared to non-Hispanic Whites. In the enabling domain, compared to children who had continuous-adequate-private insurance, children in all other categories of insurance had lower odds of having access to higher/moderate versus lower quality care. Additionally, compared to children living at or below 100 % of the FPL, children in all other categories of the FPL except those living at >300–400 % had lower odds of having access to higher/moderate versus lower quality care.

Those with greater odds of having access to lower quality care versus no access to care, by domain, were: predisposing domain—non-Hispanic Blacks (AOR 5.52; 95 % CI 2.69–11.29) and Hispanics (AOR 2.65; 95 % CI 1.06–6.62) compared to non-Hispanic Whites; enabling—children with continuous-adequate-public insurance (AOR 4.95; 95 % 1.90–12.86) compared to those with continuous-adequate-private insurance; those living at >200–300 % (AOR 3.30; 95 % CI 1.06–10.31) and above 400 % (AOR 3.35; 95 % CI 1.08–10.38) of the FPL compared to those living at or below 100 % of the FPL (Table 4). Analyses among the subpopulation of CSHCN showed larger, less precise estimates generally in the same direction of those obtained among the entire study sample (Data not shown).

Discussion

Only about a third of Georgia's children ages 4–17 years are reported to have access to higher quality care. Non-Hispanic Black and Hispanic children, children with any other category of insurance coverage apart from continuous-adequate-private insurance, had lower odds of having access to higher/moderate quality care. Compared to having no access to care, non-Hispanic Black and Hispanic children, children with continuous-adequate-public insurance, had greater odds of having access to lower quality care.

Of all the factors identified in this study to be associated with having access to quality health care, the most mutable factor may be insurance coverage. Ensuring that children have continuous insurance coverage, a choice of providers, access to a wide range of benefits, and low out-of-pocket costs are potential opportunities for increasing access to quality care for Georgia children. The Medicaid and PeachCare for Kids programs in Georgia, while providing eligible children with access to needed care, may be able to increase the quality of this care by ensuring that pediatricians who accept these children are willing and able to provide them with family-centered care. A potential barrier to providing family-centered care is lower reimbursement rates in the public insurance market than in the private market. As a result, pediatricians who see Medicaid/PeachCare for Kids patients may have to increase their patient volume in order to achieve equity with private patient reimbursements, decreasing time that can be spent with each patient. By providing adequate reimbursement rates, the state may realize improved provider participation, improved quality of care, and increased opportunity to monitor quality among participating providers.

This study found evidence that Georgia minority populations have significantly lower odds of having access to higher/moderate quality care. This may be connected to cultural differences between providers and patients, and possibly racial/ethnic discrimination. However, we were unable to explore these factors in our data.

While this analysis was limited in its ability to fully explore CSHCN, the consistently similar directions of association as was observed for the full population of 4–17 year olds, has provided information to help the state move forward with improving access to quality care among this high needs group. In order to ensure smooth transitions from pediatric providers to adult health care providers for this special population, it is important to maintain the recommended yearly well-checkups for developmentally appropriate health assessments and counseling. The Children's Medical Services program in Georgia, a state health program with responsibility to provide care coordination and other needed services for children (0–21 years) with an eligible chronic medical condition and who meet the financial criteria, may better serve its clients by developing procedures to help support clients in making visits regularly to their pediatricians. Doing so will increase opportunities for developing transition plans from pediatric to adult health care providers. Making this transition smooth will also help the state to meet the Title V Block Grant National Performance Measure 6: the percentage of youth with special health care needs who received the services necessary to make transitions to all aspects of adult life, including adult health care, work and independence.

To support monitoring of this issue, Georgia adopted a state-developed performance measure (State Performance Measure 6) in 2011: the percent of pediatricians and family physicians that have positive attitudes toward treating children with special health care needs. To support the improvement of the quality of care received among CSHCN across the age spectrum, Georgia is conducting an attitudinal survey of AAP-Georgia Chapter and the Georgia Association of Family Physicians membership, and holding meetings with leaders in Georgia medical schools to develop a strategy for increasing the exposure of medical students to treatment of CSHCN.

Our study has strengths and limitations. Although several previous studies have described characteristics associated with health care access [5, 9–19, 28, 32, 33] or quality [14, 16, 17, 20, 21], we are not aware of any study that has explored access and quality holistically, as done in this paper. Other strengths of this study are the inclusion of contextual variables; the ability to limit the study sample to Georgia, which enabled us to provide state-level estimates that could inform the operation of Georgia public health programs; and the selection of independent variables based on a well-established theoretical framework. Study limitations include the cross-sectional design of the NSCH, which precludes drawing causal inferences; the use of responses based on unverified parents' perceptions; the potential for reporting errors given that the survey required parents to report on occurrences in the past year; and not using a multilevel modeling approach to address the county level variables. Although we found that associations generally paralleled those of the non-CSHCN population, we were limited by sample size in our ability to fully explore associations among CSHCN.

With our study of a composite measure of access to quality health care, we were able to identify key related factors that may help inform improvement to overall care for Georgia's children. Activities related to improving access to continuous, adequate insurance coverage and addressing the lack of access to high quality care among minorities may provide the best opportunities for Georgia to ensure that all children in the state have access to high quality health care.

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Table 1

Characteristics of the study population of Georgia children aged 4–17 years, National Survey of Children's Health, 2007 (n = 1,397)

Characteristics	Unweighted n	Weighted prevalence	95 % CI
Outcome			
Access to quality health care			
Access to higher quality care	483	32.8	29.1–36.8
Access to moderate quality care	352	24.8	21.5–28.4
Access to lower quality care	291	22.8	19.4–26.7
No access	242	19.6	16.5–23.0
Missing	29		
Independent variables			
External environment			
Paths in the neighborhood			
No	571	41.6	37.6–45.7
Yes	817	58.4	54.3–62.4
Missing	9		
Park in the neighborhood			
No	425	31.9	28.1–35.9
Yes	964	68.1	64.1–71.9
Missing	8		
Recreation center in the neighborhood			
No	478	34.4	30.6–38.4
Yes	885	65.6	61.6–69.4
Missing	34		
Library in the neighborhood			
No	209	17.1	14.2–20.6
Yes	1,172	82.9	79.4–85.8
Missing	16		
Litter on street or sidewalk			
No	1,208	83.6	79.9–86.7
Yes	176	16.4	13.3–20.1
Missing	13		
Rundown housing in the neighborhood			
No	1,274	89.5	86.5–92.0
Yes	112	10.5	8.1–13.5
Missing	11		
Vandalism in the neighborhood			
No	1,318	94.6	92.4–96.2
Yes	68	5.4	3.8–7.7
Missing	11		
Predisposing characteristics			

Characteristics	Unweighted n	Weighted prevalence	95 % CI
Age of child (years)			
4–9	576	45.8	41.7–49.9
10–13	363	26.1	22.6–29.9
14–17	458	28.2	24.8–31.8
Sex			
Male	729	51.4	47.3–55.4
Female	667	48.7	44.6–52.7
Missing	1		
Total number of adults in the household			
1	161	15.3	12.1–19.0
2	909	65.0	60.9–68.9
3+	324	19.7	16.9–23.0
Missing	3		
Total number of children in the household			
1	576	22.7	20.0–25.6
2	543	38.9	35.1–42.9
3+	278	38.4	34.2–42.8
Parental educational attainment			
Less than high school	82	10.7	8.0–14.2
High school graduate	191	25.6	21.7–29.9
More than high school	1,110	63.7	59.2–67.9
Missing	14		
Race/ethnicity (of child)			
Non-hispanic white	825	48.6	44.5–52.7
Non-hispanic black	343	34.8	30.7–39.2
Non-hispanic other	104	6.9	5.3–8.9
Hispanic	99	9.8	7.3–12.9
Missing	26		
Employment for at least 50 weeks out of 52 weeks			
No	135	14.2	11.2–17.8
Yes	1,248	85.8	82.2–88.8
Missing	14		
Family structure type			
Two parent biological/adopted	932	59.9	55.7–64.0
Two parent step family	110	10.6	8.1–13.7
Single mother, no father present	242	21.9	18.4–25.9
Other	109	7.6	5.8–9.9
Missing	4		
Immigrant family type (full)			
Foreign-born child	42	5.4	3.6–8.0
US-born child with 2 foreign-born parents	77	9.2	6.7–12.4
US-born child with 1 foreign-born parent	73	6.9	4.9–9.6

Characteristics	Unweighted n	Weighted prevalence	95 % CI
Nonimmigrant family	841	78.6	74.5–82.2
Missing	364		
Immigrant family type (recoded)			
Foreign born child	42	5.4	3.6–8.0
Non-foreign born child	991	94.6	92.0–96.4
Missing	364		
Primary language spoken in household			
English	1,317	91.9	89.2–94.1
Language other than English	80	8.1	6.0–10.9
Mother's length of stay in the US (years)			
<10	52	6.1	4.2–8.9
10–19	51	4.8	3.3–7.0
20+	64	4.5	3.0–6.7
Born in the US	1,110	84.5	81.1–87.5
Missing	120		
Neighborhood social support			
Strong support	524	36.9	33.1–41.0
Moderate support	585	43.3	39.2–47.4
Weak support	234	19.8	16.6–23.4
Missing	54		
Social capital index			
4 (Highest)	524	36.9	33.1–41.0
5–7	498	37.1	33.2–41.3
8–10	234	17.4	14.4–20.7
11+ (Lowest)	87	8.6	6.4–11.5
Missing	54		
Enabling resources			
Number of federally qualified health centers—2007			
0	575	49.7	45.6–53.7
1	160	12.2	9.9–14.9
2+	662	38.2	34.4–42.1
Health professional shortage areas (for primary care)—2007			
The whole county	572	47.0	42.9–51.1
One or more parts of the county	129	13.0	10.2–16.5
None of the county	696	40.0	36.2–43.9
Medically underserved areas in the county			
No	138	12.5	9.8–15.7
Yes	1,259	87.5	84.3–90.2
Rural–urban designation			
Rural county	231	18.9	15.8–22.4
Urban county	1,166	81.1	77.6–84.2
Insurance coverage			

Characteristics	Unweighted n	Weighted prevalence	95 % CI
Never insured/intermittently insured	165	17.8	14.6–21.6
Continuous-inadequate-private	234	12.7	10.5–15.2
Continuous-inadequate-public	41	3.4	2.1–5.4
Continuous-adequate-private	711	42.7	38.8–46.7
Continuous-adequate-public	211	23.3	19.6–27.5
Missing	35		
Federal poverty Level[a], %			
At or below 100	159	19.7	16.1–24.0
>100–200	205	22.6	19.0–26.7
>200–300	213	18.4	15.3–21.9
>300–400	196	11.4	9.4–13.6
Above 400	624	28.0	24.8–31.4
Child has a usual source of care			
No	69	6.2	4.3–8.9
Yes	1,326	93.8	91.1–95.7
Missing	2		
Child has a personal doctor or nurse			
No	116	10.2	7.9–13.1
Yes	1,274	89.8	86.9–92.1
Missing	7		
Need variables			
Child with special health care needs			
No	1,078	77.7	74.1–80.9
Yes	319	22.3	19.1–25.9
Child's health status			
Excellent	906	57.9	53.7–62.0
Very good	330	27.8	24.0–31.9
Good/fair/poor	160	14.3	11.5–17.8
Missing	1		

Data Source National Center for Health Statistics and Maternal and Child Health Bureau, National Survey of Children's Health, 2007, the Area Resource File, 2008, and the HRSA medically underserved area variable

[a]The estimates for household income as a percentage of the Federal Poverty Level (FPL) were derived from analyzing the 5 multiply-imputed FPL variables

Table 2

Prevalence of access to quality health care by environmental, predisposing, enabling resources, and need variables, Georgia children aged 4–17 years, National Survey of Children's Health, 2007 (N = 1,397)

Characteristics	Access to quality health care				*p* value
	Unweighted n = 483 Access to higher quality care (weighted %) 95 % CI	Unweighted n = 352 Access to moderate quality care (weighted %) 95 % CI	Unweighted n = 291 Access to lower quality care (weighted %) 95 % CI	Unweighted n= 242 No access (weighted %) 95 % CI	
Independent variables					
External environment					
Paths in the neighborhood					0.38
No	31.1 (25.5, 37.3)	24.5 (19.5, 30.3)	21.5 (16.5, 27.5)	23.0 (17.9, 28.9)	
Yes	34.3 (29.5, 39.5)	24.8 (20.6, 29.6)	23.9 (19.3, 29.2)	17.0 (13.4, 21.3)	
Park in the neighborhood					0.42
No	29.9 (23.5, 37.1)	22.7 (17.4, 29.0)	27.1 (20.5, 34.8)	20.4 (15.2, 26.9)	
Yes	34.4 (29.9, 39.2)	25.6 (21.6, 30.1)	20.9 (17.0, 25.4)	19.1 (15.5, 23.4)	
Recreation center in the neighborhood					0.03
No	28.9 (23.3, 35.1)	20.1 (15.8, 25.3)	28.8 (22.3, 36.2)	22.2 (16.7, 29.0)	
Yes	35.1 (30.3, 40.2)	27.3 (22.9, 32.2)	19.8 (15.9, 24.4)	17.7 (14.3, 21.8)	
Library in the neighborhood					0.08
No	29.6 (21.6, 39.2)	17.3 (11.9, 24.5)	32.2 (22.8, 43.3)	20.9 (13.1, 31.7)	
Yes	33.6 (29.5, 38.0)	26.3 (22.6, 30.4)	20.7 (17.2, 24.8)	19.3 (16.1, 23.0)	
Litter on street or sidewalk					0.85
No	32.9 (29.0, 37.0)	25.3 (21.7, 29.3)	22.5 (18.8, 26.7)	19.3 (16.1, 23.0)	
Yes	34.0 (23.4, 46.5)	21.2 (14.1, 30.5)	24.6 (15.7, 36.3)	20.3 (12.7, 30.9)	
Rundown housing in the neighborhood					0.38
No	33.3 (29.4, 37.5)	25.5 (22.0, 29.4)	21.7 (18.2, 25.7)	19.5 (16.2, 23.2)	
Yes	30.5 (19.9, 43.7)	16.9 (9.1, 29.3)	32.2 (19.8, 47.8)	20.4 (12.4, 31.6)	
Vandalism in the neighborhood					0.07
No	33.9 (30.0, 38.0)	25.2 (21.8, 28.9)	21.6 (18.1, 25.5)	19.4 (16.2, 22.9)	
Yes	16.8 (9.2, 28.7)	16.1 (6.7, 33.6)	44.4 (27.2, 63.1)	22.8 (11.5, 40.0)	
Predisposing characteristics					
Age of child (years)					0.05
4–9	37.0 (31.2, 43.2)	27.0 (21.8, 32.9)	21.0 (16.2, 26.8)	15.0 (11.1, 20.0)	
10–13	32.1 (24.9, 40.3)	19.7 (14.4, 26.4)	24.7 (18.1, 32.7)	23.5 (17.0, 31.6)	
14–17	26.8 (21.2, 33.2)	26.1 (20.5, 32.6)	24.0 (17.7, 31.6)	23.2 (17.9, 29.4)	
Sex					0.31
Male	33.8 (28.6, 39.5)	21.6 (17.3, 26.6)	24.5 (19.7, 30.0)	20.1 (15.9, 25.1)	
Female	31.8 (26.7, 37.3)	28.2 (23.4, 33.6)	21.1 (16.4, 26.7)	18.9 (14.7, 24.0)	
Total number of adults in the household					0.65
1	32.2 (21.7, 44.9)	18.1 (11.0, 28.3)	29.7 (18.9, 43.4)	20.0 (12.2, 31.1)	
2	32.1 (27.8, 36.8)	27.1 (22.9, 31.7)	21.3 (17.3, 25.9)	19.5 (15.8, 23.8)	
3+	35.5 (27.5, 44.4)	22.3 (16.2, 29.9)	22.5 (16.4, 30.0)	19.7 (13.5, 27.8)	

Characteristics	Access to quality health care				*p* value
	Unweighted n = 483 Access to higher quality care (weighted %) 95 % CI	Unweighted n = 352 Access to moderate quality care (weighted %) 95 % CI	Unweighted n = 291 Access to lower quality care (weighted %) 95 % CI	Unweighted n= 242 No access (weighted %) 95 % CI	
Total number of children in the household					0.68
1	31.3 (26.0, 37.1)	23.3 (18.6, 28.7)	27.7 (21.9, 34.4)	17.7 (13.9, 22.3)	
2	31.5 (26.3, 37.2)	27.4 (22.4, 33.0)	21.9 (16.8, 27.9)	19.3 (14.8, 24.8)	
3+	35.1 (27.9, 43.0)	23.0 (17.1, 30.2)	20.9 (14.9, 28.4)	21.0 (15.3, 28.0)	
Parental educational attainment					0.02
Less than high school	33.3 (20.1, 49.8)	12.9 (6.0, 25.4)	29.3 (17.9, 43.9)	24.6 (13.4, 40.8)	
High school graduate	29.4 (21.2, 39.1)	20.5 (13.7, 29.6)	32.0 (23.1, 42.4)	18.2 (11.8, 26.9)	
More than high school	34.6 (30.6, 38.8)	28.5 (24.7, 32.7)	17.6 (14.4, 21.3)	19.3 (16.1, 23.0)	
Race/ethnicity (of child)					<0.01
Non-hispanic white	39.5 (34.7, 44.6)	27.4 (23.1, 32.2)	12.0 (9.0, 15.9)	21.1 (17.4, 25.3)	
Non-hispanic black	31.7 (24.5, 39.8)	20.2 (14.7, 27.1)	35.4 (27.8, 43.8)	12.7 (8.3, 18.8)	
Non-hispanic other	21.9 (12.9, 34.7)	38.6 (26.2, 52.5)	20.5 (11.5, 33.9)	19.0 (10.7, 31.6)	
Hispanic	12.7 (5.8, 25.7)	17.4 (8.4, 32.9)	31.8 (20.4, 46.0)	38.0 (23.6, 54.9)	
Employment for at least 50 weeks out of 52 weeks					0.34
No	32.5 (21.4, 46.0)	16.8 (8.4, 30.7)	29.7 (19.9, 41.9)	21.0 (12.8, 32.5)	
Yes	33.0 (29.2, 37.2)	25.9 (22.5, 29.7)	21.6 (17.9, 25.8)	19.5 (16.2, 23.2)	
Family structure type					0.75
Two parent biological/adopted	33.8 (29.4, 38.4)	26.5 (22.4, 31.0)	21.0 (17.0, 25.6)	18.8 (15.2, 23.0)	
Two parent step family	32.2 (20.2, 47.1)	25.9 (16.0, 39.2)	22.1 (12.4, 36.1)	19.8 (11.0, 33.2)	
Single mother, no father present	29.1 (20.9, 39.0)	18.9 (12.7, 27.2)	28.6 (20.0, 39.0)	23.4 (16.4, 32.4)	
Other	38.4 (25.4, 53.3)	24.3 (13.5, 39.9)	22.0 (13.7, 33.5)	15.3 (7.0, 30.0)	
Immigrant family type (full)					0.01
Foreign-born child	17.6 (7.8, 35.0)	9.6 (4.1, 20.7)	28.7 (13.4, 51.3)	44.1 (25.1, 65.1)	
US-born child with 2 foreign-born parents	13.5 (6.7, 25.5)	30.7 (17.5, 48.2)	35.2 (21.8, 51.3)	20.6 (9.8, 38.2)	
US-born child with 1 foreign-born parent	32.0 (18.2, 50.0)	30.1 (16.9, 47.6)	19.2 (9.9, 33.9)	18.7 (7.6, 39.3)	
Nonimmigrant family	37.6 (32.7, 42.8)	27.3 (22.9, 32.1)	18.7 (14.5, 23.7)	16.5 (13.2, 20.4)	
Immigrant family type (recoded)					0.03
Foreign-born child	17.6 (7.8, 35.0)	9.6 (4.1, 20.7)	28.7 (13.4, 51.3)	44.1 (25.1, 65.1)	
Non-foreign born child	34.9 (30.5, 39.6)	27.8 (23.7, 32.3)	20.3 (16.4, 24.8)	17.0 (13.8, 20.8)	
Primary language spoken in household					<0.01
English	35.3 (31.3, 39.4)	25.6 (22.1, 29.3)	21.5 (18.0, 25.6)	17.7 (14.8, 21.0)	
Language other than English	5.3 (2.1, 13.1)	16.4 (7.6, 31.8)	37.2 (24.2, 52.4)	41.2 (26.1, 58.0)	
Mother's length of stay in the US (in years)					<0.01
<10	8.3 (3.0, 20.9)	12.7 (4.5, 30.8)	34.0 (19.1, 53.0)	45.0 (26.4, 65.1)	
10–19	8.8 (3.6, 20.2)	25.7 (12.3, 46.0)	41.0 (24.2, 60.2)	24.5 (11.0, 46.0)	
20+	23.0 (12.0, 39.7)	21.8 (10.7, 39.3)	31.8 (15.3, 54.7)	23.4 (9.6, 46.8)	
Born in the US	36.1 (31.7, 40.7)	25.6 (21.8, 29.7)	20.4 (16.6, 24.9)	17.9 (14.8, 21.5)	
Neighborhood social support					<0.01

Characteristics	Access to quality health care				*p* value
	Unweighted n = 483 Access to higher quality care (weighted %) 95 % CI	Unweighted n = 352 Access to moderate quality care (weighted %) 95 % CI	Unweighted n = 291 Access to lower quality care (weighted %) 95 % CI	Unweighted n= 242 No access (weighted %) 95 % CI	
Strong support	44.4 (38.0, 51.0)	22.4 (17.5, 28.4)	13.3 (9.8, 17.7)	19.9 (15.0, 25.9)	
Moderate support	30.3 (24.7, 36.6)	28.9 (23.7, 34.6)	24.7 (18.9, 31.5)	16.2 (12.2, 21.2)	
Weak support	15.4 (10.8, 21.6)	19.6 (12.9, 28.6)	37.8 (28.7, 47.8)	27.2 (19.2, 37.0)	
Social capital index					<0.01
4 (Highest)	44.4 (38.0, 51.0)	22.4 (17.5, 28.4)	13.3 (9.8, 17.7)	19.9 (15.0, 25.9)	
5–7	32.4 (26.1, 39.4)	25.7 (20.6, 31.7)	25.1 (19.0, 32.5)	16.8 (12.4, 22.3)	
8–10	18.6 (13.2, 25.5)	32.1 (23.3, 42.4)	29.7 (21.0, 40.1)	19.7 (12.9, 28.8)	
11+ (Lowest)	10.7 (5.5, 19.8)	14.3 (7.3, 26.0)	42.9 (28.3, 58.9)	32.1 (19.2, 48.6)	
Enabling resources					
Number of Federally Qualified Health Centers—2007					0.18
0	34.3 (28.7, 40.4)	25.2 (20.2, 30.9)	23.2 (18.2, 29.2)	17.3 (13.2, 22.4)	
1	32.5 (23.2, 43.5)	23.4 (15.0, 34.6)	13.9 (8.3, 22.4)	30.1 (21.0, 41.2)	
2+	31.0 (25.8, 36.7)	24.8 (20.3, 29.8)	25.1 (19.7, 31.5)	19.1 (14.6, 24.7)	
Health professional shortage areas (for primary care)—2007					0.13
The whole county	30.8 (25.7, 36.4)	26.0 (21.0, 31.8)	21.3 (16.5, 27.2)	21.9 (17.2, 27.4)	
One or more parts	43.4 (30.8, 57.0)	14.1 (8.4, 22.6)	23.1 (13.6, 36.5)	19.4 (11.6, 30.5)	
None of the county	31.6 (26.6, 37.2)	27.0 (22.1, 32.4)	24.5 (19.4, 30.3)	16.9 (12.9, 22.0)	
Medically underserved areas					0.67
No	32.4 (22.1, 44.8)	19.2 (11.0, 31.3)	28.1 (17.0, 42.7)	20.3 (12.4, 31.4)	
Yes	32.9 (29.0, 37.0)	25.6 (22.1–29.5)	22.1 (18.6, 26.0)	19.5 (16.2, 23.2)	
Rural–urban designation					0.40
Rural county	33.3 (24.7, 43.1)	19.1 (12.7, 27.6)	27.1 (19.0, 37.2)	20.5 (14.0, 29.1)	
Urban county	32.7 (28.7, 37.0)	26.2 (22.5, 30.2)	21.8 (18.1, 26.0)	19.4 (16.0, 23.2)	
Insurance coverage					<0.01
Never insured/intermittently insured	19.8 (11.8–31.3)	13.8 (8.5–21.8)	29.1 (20.4–39.7)	37.3 (27.0–48.9)	
Continuous-inadequate-private	25.8 (19.0–34.1)	24.7 (17.6–33.5)	23.0 (16.0–32.0)	26.5 (18.2–36.9)	
Continuous-inadequate-public	28.2 (9.6–59.1)	11.6 (4.1–28.7)	46.6 (24.4–70.2)	13.6 (5.0–32.1)	
Continuous-adequate-private	41.9 (36.6–47.4)	29.8 (24.9–35.2)	12.7 (9.2–17.3)	15.6 (12.3–19.6)	<0.01
Continuous-adequate-public	33.0 (24.4–42.9)	25.7 (17.9–35.4)	32.1 (23.1–42.7)	9.2 (5.4–15.4)	<0.01
Federal poverty level, %[a]					
At or below 100	36.2 (25.8, 48.0)	14.6 (8.0, 25.2)	26.2 (17.9, 36.5)	23.0 (15.0, 33.8)	
>100–200	22.7 (15.6, 31.9)	20.3 (13.8, 28.93)	32.5 (23.2, 43.5)	24.4 (16.8, 34.0)	
>200–300	27.6 (19.3, 37.9)	30.2 (21.6, 40.4)	25.0 (16.8, 35.5)	17.2 (11.1, 25.8)	
>300–400	38.8 (30.1, 48.3)	34.6 (26.1, 44.3)	12.2 (7.4, 19.3)	14.5 (9.0, 22.5)	
Above 400	39.6 (34.0, 45.4)	28.2 (22.8, 34.4)	15.4 (11.5, 20.5)	16.8 (12.8, 21.7)	
Child has a usual source of care					0.02
No	14.2 (5.4, 32.5)	13.0 (3.7, 36.7)	36.0 (20.5, 55.2)	36.8 (20.7, 56.5)	

Characteristics	Access to quality health care				*p* value
	Unweighted n = 483 Access to higher quality care (weighted %) 95 % CI	Unweighted n = 352 Access to moderate quality care (weighted %) 95 % CI	Unweighted n = 291 Access to lower quality care (weighted %) 95 % CI	Unweighted n= 242 No access (weighted %) 95 % CI	
Yes	34.1 (30.2, 38.1)	25.6 (22.2, 29.3)	21.9 (18.4, 25.9)	18.4 (15.4, 21.9)	
Child has a personal doctor or nurse					0.01
No	25.2 (14.7, 39.6)	11.2 (5.5, 21.7)	27.5 (17.1, 41.0)	36.2 (23.8, 50.7)	
Yes	33.6 (29.7, 37.7)	26.3 (22.8, 30.2)	22.4 (18.7, 26.5)	17.7 (14.7, 21.2)	
Need variables					
Child with special health care needs					0.09
No	31.9 (27.7, 36.3)	23.1 (19.6, 27.1)	24.6 (20.5, 29.2)	20.4 (16.8, 24.5)	
Yes	36.0 (28.2, 44.7)	30.7 (23.2, 39.3)	16.6 (11.3, 23.8)	16.7 (11.7, 23.4)	
Child's health status					<0.01
Excellent	37.9 (33.3, 42.8)	24.8 (20.9, 29.2)	18.8 (15.1, 23.1)	18.5 (15.0, 22.6)	
Very good	25.5 (18.8, 33.7)	30.5 (23.3, 38.9)	24.7 (17.7, 33.4)	19.3 (13.6, 22.6)	
Good/Fair/Poor	26.6 (17.3, 38.7)	13.3 (7.7, 22.0)	35.5 (24.6, 48.1)	24.6 (15.5, 36.8)	

Data Source National Center for Health Statistics and Maternal and Child Health Bureau, National Survey of Children's Health, 2007, the Area Resource File, 2008, and the HRSA medically underserved area variable

[a]The estimates for household income as a percentage of the Federal Poverty Level (FPL) were derived from analyzing the 5 multiply-imputed FPL variables

Table 3

Association (adjusted odds ratios, AOR) of environmental, predisposing, enabling resources, and need variables with access to quality health care from domain-specific models, Georgia children aged 4–17 years, National Survey of Children's Health, 2007

Characteristics	Access to quality health care	
	Access to higher/moderate quality care versus lower quality care AOR (95 % CI)	Access to lower quality care versus no access to care AOR (95 % CI)
Independent variables		
External environmental		
Paths in the neighborhood		
No	Ref.	Ref.
Yes	0.82 (0.51–1.31)	1.85 (1.03–3.31)*
Recreation center in the neighborhood		
No	Ref.	Ref.
Yes	1.76 (1.11–2.79)*	0.87 (0.49–1.54)
Vandalism in the neighborhood		
No	3.89 (1.70–8.86)*	0.59 (0.23–1.56)
Yes	Ref.	Ref.
Predisposing characteristics		
Age of child (years)		
4–9	1.42 (0.75–2.72)	1.76 (0.82–3.76)
10–13	1.53 (0.70–3.36)	1.19 (0.49–2.91)
14–17	Ref.	Ref.
Sex		
Male	Ref.	Ref.
Female	1.76 (1.02–3.03)*	0.86 (0.45–1.65)
Parental educational attainment		
Less than high school	Ref.	Ref.
High school graduate	3.02 (0.74–12.31)	0.54 (0.13–2.22)
More than high school	4.49 (1.23–16.39)*	0.32 (0.09–1.13)
Race/ethnicity (of child)		
Non-hispanic white	Ref.	Ref.
Non-hispanic black	0.29 (0.16–0.54)*	8.42 (3.41–20.76)*
Non-hispanic other	0.51 (0.20–1.25)	2.10 (0.71–6.19)
Hispanic	0.22 (0.07–0.66)*	1.15 (0.40–3.25)
Immigrant family type		
Foreign-born child	Ref.	Ref.
Non-foreign born child	1.44 (0.44–4.71)*	2.20 (0.63–7.64)
Neighborhood social support		
Strong support	4.04 (1.84–8.87)*	0.40 (0.16–0.96)*
Moderate support	1.97 (0.92–4.22)	0.94 (0.39–2.26)

Characteristics	Access to quality health care	
	Access to higher/moderate quality care versus lower quality care AOR (95 % CI)	Access to lower quality care versus no access to care AOR (95 % CI)
Weak support	Ref.	Ref.
Enabling resources		
Number of Federally Qualified Health Centers—2007		
0	Ref.	Ref.
1	1.61 (0.77–3.37)	0.39 (0.17–0.87)*
2+	0.76 (0.47–1.24)	1.20 (0.67–2.13)
Insurance coverage		
Never insured/intermittently insured	0.25 (0.12–0.51)*	1.08 (0.48–2.41)
Continuous-inadequate-private	0.41 (0.23–0.75)*	1.12 (0.54–2.34)
Continuous-inadequate-public	0.15 (0.05–0.47)*	4.63 (1.14–18.89)*
Continuous-adequate-private	Ref.	Ref.
Continuous-adequate-public	0.39 (0.19–0.81)*	5.10 (2.01–12.96)*
Federal poverty level, %[a]		
At or below 100	Ref.	Ref.
>100–200	0.44 (0.20–0.98)*	1.48 (0.59–3.74)
>200–300	0.62 (0.26–1.49)	1.78 (0.64–4.95)
>300–400	1.30 (0.54–3.12)	1.30 (0.43–3.91)
Above 400	0.91 (0.41–2.05)	1.43 (0.53–3.88)
Child has a usual source of care		
No	Ref.	Ref.
Yes	4.26 (1.45–12.53)*	0.90 (0.34–2.41)
Need variables		
Child with special health care needs		
No	Ref.	Ref.
Yes	2.36 (1.30 4.30)*	0.74 (0.37–1.48)
Child's health status		
Excellent	3.67 (1.94–6.91)*	0.66 (0.30–1.46)
Very good	2.11 (1.05–4.23)*	0.88 (0.37–2.06)
Good/Fair/Poor	Ref.	Ref.

Domain-specific models are presented. Each domain model (environmental, predisposing, enabling and need) was run without adjusting for the variables in any other domain

Data Source National Center for Health Statistics and Maternal and Child Health Bureau, National Survey of Children's Health, 2007, the Area Resource File, 2008, and the HRSA medically underserved area variable

*Statistically significant association at $p < 0.05$

[a]The estimates for household income as a percentage of the Federal Poverty Level (FPL) were derived from analyzing the 5 multiply-imputed FPL variables

Table 4

Association (adjusted odds ratio, AOR) of environmental, predisposing, enabling resources, and need variables with access to quality health care from the full model, Georgia children aged 4–17 years, National Survey of Children's Health, 2007

Characteristics	Entire population (N = 1,257)[a]	
	Access to higher/moderate quality care versus lower quality care AOR (95 % CI)	Access to lower quality care versus no access to care AOR (95 % CI)
Independent variables		
External environmental		
Recreation center in the neighborhood		
No	Ref.	Ref.
Yes	1.60 (0.98–2.60)	0.66 (0.37–1.19)
Vandalism in the neighborhood		
No	3.37 (1.40–8.13)*	0.62 (0.21–1.85)
Yes	Ref.	Ref.
Predisposing characteristics		
Age of child (years)		
4–9	1.37 (0.78–2.41)	1.58 (0.82–3.04)
10–13	1.08 (0.58–1.99)	1.09 (0.52–2.27)
14–17	Ref.	Ref.
Sex		
Male	Ref.	Ref.
Female	1.62 (1.02–2.57)*	0.67 (0.38–1.19)
Race/ethnicity (of child)		
Non-hispanic white	Ref.	Ref.
Non-hispanic black	0.31 (0.18–0.53)*	5.52 (2.69–11.29)*
Non-hispanic other	0.64 (0.30–1.37)	1.93 (0.75–4.98)
Hispanic	0.20 (0.08–0.50)*	2.65 (1.06–6.62)*
Neighborhood social support		
Strong support	3.50 (1.84–6.64)*	0.72 (0.33–1.55)
Moderate support	1.70 (0.94–3.07)	1.84 (0.87–3.86)
Weak support	Ref.	Ref.
Enabling resources		
Insurance coverage		
Never insured/intermittently insured	0.30 (0.14–0.65)*	0.91 (0.39–2.10)
Continuous-inadequate-private	0.46 (0.23–0.94)*	1.08 (0.46–2.53)
Continuous-inadequate-public	0.15 (0.05–0.48)*	3.77 (0.92–15.50)
Continuous-adequate-private	Ref.	Ref.
Continuous-adequate-public	0.35 (0.17–0.70)*	4.95 (1.90–12.86)*
Federal poverty level, %[b]		

Characteristics	Entire population (N = 1,257)[a]	
	Access to higher/moderate quality care versus lower quality care AOR (95 % CI)	Access to lower quality care versus no access to care AOR (95 % CI)
At or below 100	Ref.	Ref.
>100–200	0.31 (0.13–0.71)*	1.85 (0.67–5.09)
>200–300	0.33 (0.14–0.78)*	3.30 (1.06–10.31)*
>300–400	0.59 (0.22–1.60)	2.23 (0.65–7.64)
Above 400	0.29 (0.12–0.71)*	3.35 (1.08–10.38)*
Child has a usual source of care		
No	Ref.	Ref.
Yes	3.27 (1.15–9.26)*	0.96 (0.33–2.78)
Need variables		
Child with special health care needs		
No	Ref.	Ref.
Yes	2.68 (1.42–5.05)*	0.59 (0.28–1.23)
Child's health status		
Excellent	2.86 (1.38–5.91)*	0.80 (0.33–1.95)
Very good	2.19 (1.01–4.76)*	0.86 (0.35–2.12)
Good/Fair/Poor	Ref.	Ref.

All variables in the table were entered simultaneously into the full model

Data Source National Center for Health Statistics and Maternal and Child Health Bureau, National Survey of Children's Health, 2007, the Area Resource File, 2008, and the medically underserved area variable

*Statistically significant association at $p < 0.05$

[a]Sample size of full model in specified population

[b]The estimates for household income as a percentage of the Federal Poverty Level (FPL) were derived from analyzing the 5 multiply-imputed FPL variables